

1 Setting the Stage for a Sustainable Pacific Salmon Fisheries Strategy

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Abstract.—Salmon and steelhead *Oncorhynchus* spp. have been keystone species for ecosystems and human cultures of the North American Pacific coast for eons. Yet, in the past century, many populations have been greatly diminished and some are now extinct—the result of a combination of factors, including habitat loss and degradation, overfishing, natural variability in salmon production, negative effects of artificial propagation, and weaknesses in institutional and regulatory structures. We argue that a major shift is required, from the egocentric environmental approach (wherein each part of the ecosystem is managed as a unit) to the ecocentric ecosystem approach (wherein all parts are integrated for management). A management framework is proposed that contains—for each management unit such as a watershed—four elements: management goals; management objectives; ecosystem indicators; and a coordinated action plan. We also describe the Sustainable Fisheries Strategy, a consultative process for developing an ecosystem-based approach toward achieving sustainable Pacific salmon and steelhead populations and fisheries. This book is one of three important underpinnings of the Strategy; the other two are the Strategy itself and a manual being developed to guide community-based programs embracing the principles of sustainable fisheries. This book contains important historical perspectives as well as numerous innovative ideas for moving toward ecosystem-oriented, sustainable management of Pacific salmon and steelhead.

INTRODUCTION

Salmon and steelhead *Oncorhynchus* spp. serve as a powerful symbol for the quality of life enjoyed in the Pacific Northwest and generate a wide range of economic, social, and cultural benefits in the region. Commercial fisheries contribute significantly to local, provincial/state, and national economies, both directly through the sale of fish and indirectly through related service and manufacturing industries. Likewise, sport fisheries provide diverse economic benefits through the tourist, manufacturing, and service sectors. First Nations (Canada) and Tribal (U.S.) fisheries revitalize local economies, encourage social stabilization and renewal, and help maintain the rich cultural heritage that characterizes the Pacific Northwest. Considering the nature and extent of benefits that they bestow, the conservation of our shared salmon and steelhead resources merit national and international priority.

Despite the vast quantities of time, money, and effort spent on fisheries management, there has been a widespread and marked decline in the size and number of salmonid populations in the Pacific Northwest over the last century (e.g., Nehlsen et al. 1991; Slaney et al. 1996). Numerous populations have been extirpated, and many that remain are at precariously low levels and trending downward. While natural factors have undoubtedly played a role, the overriding causes of decline have been associated with human activities. The current status and trends of these populations

reflect our inability to effectively manage the fishery resource and take the necessary steps to avert further declines in population abundance. The blame, as well as the responsibility for action, falls upon all of us—scientists, managers, resource users, and the public. Together, we must cooperate in the development and implementation of a comprehensive fisheries management strategy to ensure that west coast salmon populations are sustained and enhanced for future generations.

People throughout the Pacific Northwest are recognizing the need for such a strategy and many have agreed to work cooperatively on the development of a *Sustainable Fisheries Strategy (SFS) for West Coast Salmon and Steelhead Populations*. According to the more than 500 participants who attended the "Toward Sustainable Fisheries" conference held in Victoria, British Columbia April 26–30, 1996, sustainable fisheries can be defined as:

the conditions that support healthy, diverse, and productive ecosystems, viable aboriginal, sport, and commercial fisheries, and vital and stable communities throughout the historical range of anadromous Pacific salmonids.

This book, *Sustainable Fisheries Management: Pacific Salmon*, represents an important step toward sustainable fisheries because it articulates a common vision for the future, identifies the factors that are currently impeding our ability to sustainably manage salmon and steelhead, and outlines some new and innovative ideas and strategies for overcoming these constraints and moving toward sustainability. This first chapter provides a context for sustainable fisheries management by briefly describing the factors that influence fisheries sustainability, providing a framework for ecosystem-based fisheries management, and describing the overall strategy to support a transition toward sustainable fisheries management.

CHALLENGES TO THE SUSTAINABILITY OF PACIFIC SALMON

Before non-native settlement, salmon and steelhead populations flourished throughout the Pacific Northwest. As a result, humans could easily harvest all the fish they needed without adversely affecting populations (Booker 2000; Copes 2000). In many places, the abundance of salmon eclipsed the populations that exist today. For example, it has been estimated that the total run to the Columbia River was historically about 10–16 million salmon (Johnson et al. 1997). Today, the total run of salmon to this important river system is on the order of 1–3 million fish, 75% of which are of hatchery origin (Johnson et al. 1997). Similar or more dramatic reductions in the abundance of Pacific salmon have been observed throughout much of their range. The severity and extent of these declines are emphasized by the number of stocks that are either extinct or at risk of extinction (Nehlsen et al. 1991; Slaney et al. 1996). These widespread declines in anadromous salmonid abundance have led to a number of listings by the National Marine Fisheries Service (NMFS) under the U.S. Endangered Species Act (ESA), which at the time of this writing includes the species listed in Table 1.1.

Considering the importance of salmon and steelhead to the people of the Pacific Northwest, it is surprising that we have permitted their populations to fall so precipitously without effective intervention. To understand the underlying reasons for these declines, it is important to recognize that anadromous salmonids are subjected to a wide variety of stressors throughout their life history (see Groot and Margolis 1991; Burger 2000; and Hartman et al. 2000 for information on the salmon life cycle). As generally described below, the main obstacles to fisheries sustainability fall into four main categories: habitat, harvest, production, and institutional structures.

HABITAT LOSS AND DEGRADATION

Scientists and natural resource managers have long realized the need to manage terrestrial and aquatic habitats in ways that maintain normal biophysical processes, linkages within and between

TABLE 1.1
U.S. Endangered Species Act Listing Status of Salmon and Steelhead Evolutionarily Significant Units as of July 1999.

Species	Evolutionarily Significant Unit (ESU)	Proposed or actual listing	Status of listing
Chinook	Sacramento Winter	Endangered	Listed
	Snake River Spring/Summer	Threatened	Listed
	Snake River Fall	Threatened	Listed (ESU modification proposed 3/9/98)
	Puget Sound	Threatened	Listed
	Lower Columbia River	Threatened	Listed
	Upper Willamette	Threatened	Listed
	Upper Columbia River Spring	Endangered	Listed
	S. Oregon/California Coast	Threatened	Deferred until 9/99
	Cal. Central Valley Spring	Endangered	Deferred until 9/99
	Cal. Central Valley Fall	Threatened	Deferred until 9/99
Chum	Hood Canal Summer	Threatened	Listed
	Columbia River	Threatened	Listed
Coho	Central California	Threatened	Listed
	S. Oregon/N. California Coasts	Threatened	Listed
	Oregon Coast	Threatened	Listed
	Puget Sound/Strait of Georgia	Candidate	Assessments due mid-1999
	Southwest WA/Lower Columbia River	Candidate	Assessments due mid-1999
Sockeye	Snake River	Endangered	Listed
	Ozette Lake	Threatened	Listed
Steelhead	Southern California	Endangered	Listed
	South-Central California Coast	Threatened	Listed
	Central California Coast	Threatened	Listed
	Upper Columbia River	Endangered	Listed
	Snake River Basin	Threatened	Listed
	Lower Columbia River	Threatened	Listed
	California Central Valley	Threatened	Listed
	Upper Willamette River	Threatened	Listed
	Middle Columbia River	Threatened	Listed
	Northern California	Candidate	
	Klamath Mountains Province	Candidate	
	Oregon Coast	Candidate	

habitats, and a diversity of living and nonliving entities (see Hartman et al. 2000). Healthy habitat is a fundamental requirement for salmon (Burger 2000). Unfortunately, evidence from many sources strongly suggests that the natural freshwater, estuarine, and marine habitats used by salmon are under extreme stress, and many have already been irreversibly altered (e.g., Fresh and Lucchetti 2000; Jones and Moore 2000; Levings 2000; Langer et al. 2000).

Expanding human populations and associated demands on natural resources have resulted in the degradation of aquatic and riparian habitats throughout much of the Pacific Northwest (NRC 1996). Specifically, forest management activities have been linked to many adverse effects on salmon habitats, including changes in water quality, streambed substrate composition, stream hydrology, and stream morphology (e.g., Gregory and Bisson 1997). In addition, construction of

impoundments for hydropower generation and irrigation has blocked access to important spawning and rearing areas, flooded key habitats, altered streamflow conditions, and degraded water quality. Urbanization and industrial developments have also adversely affected salmon habitats by altering streamflow patterns, degrading water quality, and changing stream morphology (e.g., Fresh and Lucchetti 2000; Langer et al. 2000). Anthropogenic activities have also influenced salmon habitats in marine and estuarine systems, both through direct habitat loss and alteration (e.g., due to log storage, diking, etc.; Levings 2000) and indirectly through releases of substances that contribute to global climate change (e.g., carbon dioxide, nitrous oxide, chlorofluorocarbons, etc.). Of particular concern is the progressive northward advancement of warm ocean temperatures, a likely factor contributing to reduced marine survival of Pacific salmonids (Welch et al. 1998).

Salmon are remarkably adaptable, frequently colonizing new habitats and surviving major ecological perturbations (e.g., Milner 1989). However, their resiliency is being overwhelmed by a combination of natural and human-caused disturbances of a kind, magnitude, and frequency unlike any that have occurred in the recent past (i.e., post-glaciation). If deliberate steps are not taken to reduce the impact of human activities, the quality and productivity of freshwater and marine habitats will continue to deteriorate.

HARVEST MANAGEMENT

Fisheries around the world are under immense pressure from fishing activity. According to the Food and Agriculture Organization (FAO) of the United Nations (as cited by Christie 1993), all of the world's 17 major marine fishing grounds have been fished to their limits or beyond. Nine of these fishing grounds are now in serious decline due to overfishing. Recent experience with the Atlantic cod *Gadus morhua* fishery, off the east coast of Canada, has demonstrated that a fisheries collapse can occur even in countries with apparently well-developed management systems and access to the best scientific information. The collapse of the cod fishery has had devastating social and economic consequences for the people who live in fishing communities and many others less directly linked to the resource (Spurgeon 1997). The tragedy of this situation is that despite repeated warnings of the impending collapse by inshore fishermen, scientists, and others (Hutchings et al. 1997) the fishing continued unabated until Atlantic cod populations were reduced to less than 1% of their former abundance, requiring curtailment of virtually all harvest of that species (Spurgeon 1997).

Experience has now shown us the disastrous effects of poorly regulated, unsustainable fishing practices on fishery resources. In turn, reduction in the abundance of these resources can have serious impacts on the social, cultural, and economic fabric of the coastal communities that rely on these precious, otherwise renewable resources. Nonetheless, many of the ecological signals of unsustainability, including decreased biodiversity, reduced productivity, diminished habitat carrying capacity, reduced harvests, and declines in indicator species, have become evident in many areas throughout the Pacific Northwest (NRC 1996).

Many challenges face those responsible for managing the harvest of Pacific salmonids. Most importantly there is a lack of clear objectives for harvest management programs: i.e., are we trying to optimize biomass or biodiversity? (Hyatt and Riddell 2000). In addition, even though stock sizes have been reduced and the variability in yields has increased, the demand for salmon harvesting continues to grow. This creates greater political pressure on managers to open fisheries at a time when the stocks can least support the fishing effort. Moreover, the information and science-based tools upon which we rely to make harvest management decisions (such as escapement and run size, age structure, and stock-recruitment models) are often flawed, unavailable, or incomplete (Knudsen 2000). Thus, it is apparent that many of the strategies and procedures currently used to manage Pacific salmon fisheries are unsustainable; however, some rays of hope do shine through this gloom. For example, management of most Alaskan salmon fisheries is still relatively successful because fish are protected in terminal areas, the harvest rate on mixed stocks has been moderated, and most freshwater habitat is still intact (Van Alen 2000).

SALMON PRODUCTION

Natural Production.—No one knows exactly how many naturally produced salmon and steelhead return to most of the rivers, streams, and lakes of the Pacific Coast; nor is it well understood how many salmon should be escaping to each system. There is, however, no doubt that production of wild salmon and steelhead has declined drastically throughout a significant portion of their range over the last century. These declines have coincided with both subtle and profound reductions in the productivity of freshwater, estuarine, and marine habitats.

Salmon production is strongly influenced by variation in climate which occasionally leads to catastrophic perturbations of freshwater, estuarine, and/or marine survival of salmon (see, for example, Welch et al. 1998). Because salmon migrate through a number of different ecosystems during their life cycle, they are particularly vulnerable to the vagaries of natural phenomena in the various habitats. Each run has its own response to the environmental influences it experiences as it migrates. The run's natural survival "bottleneck" may be egg-devastating floods one year and overly warm ocean waters the next. Alternatively, when there are no substantial bottlenecks, salmon can be impressively productive. No salmon populations are immune to these natural variations; witness the 1997 and 1998 "crashes" of Bristol Bay sockeye and other western Alaskan populations following a number of years of record high run sizes (Kruse 1998).

When habitat degradation and harvest are superimposed on this naturally fragile interdependence between environment and production, it is easy to see how salmon are susceptible to decline (e.g., Lawson 1993). While scientists are still limited in their ability to understand the relationship between salmon populations and their environment, the complexities of population dynamics in runs suffering from both overharvest and altered habitats present even greater intellectual and technological challenges. Much work is still needed in our technical capability to account for the dynamic interdependence of natural and anthropogenic factors. Additionally, new ways of thinking about salmon populations indicate a significant need for social and economic acceptance of the natural variations in salmon abundance (NRC 1996; Knudsen 2000).

Artificial Production.—In response to decreasing natural productivity resulting from overexploitation and habitat loss, fisheries managers turned to artificial production techniques as a means of satisfying the growing demand for fish (e.g., Smoker et al. 2000). While releases of juvenile salmonids from production hatcheries, spawning channels, and other facilities dramatically increased productivity of some populations, the fisheries on these enhanced runs increased pressure on weaker stocks (NRC 1996). Recently, concerns have also been raised about the potential impacts of hatchery-produced fish on wild salmonids, in terms of both survival and genetic diversity (Hilborn 1992). In certain locations (e.g., Columbia River Basin), changes in ocean conditions have resulted in greatly reduced survival of hatchery salmonids, which in turn resulted in decreased benefit-to-cost ratios for these facilities (Radtko and Davis 2000). As such, the use of large hatcheries as a production tool is now commonly viewed as a threat to the sustainability of wild salmon populations. In contrast, conservation aquaculture has been identified as a key element of coordinated salmon recovery efforts (NRC 1996). For example, some populations only exist because of continued hatchery propagation.

INSTITUTIONAL AND REGULATORY STRUCTURES

A wide variety of institutions and organizations are involved in the fisheries and environmental management process. In fact, the existing management framework is so complicated that even those involved in the process find it difficult to fully understand. This complexity in the management of Pacific salmonids and their associated habitats has developed for several reasons. Our existing management structures have evolved over a period of more than 100 years. Over that time, our understanding of the resource and its interactions with people and the environment has increased dramatically. However, rather than implementing a holistic ecosystem-based approach to management, we have chosen to compartmentalize the environment and establish agencies that assume the primary responsibility for managing one or more compartments (i.e., fish, water, forests, urban developments, etc.).

While most of the existing *institutions* have adequately fulfilled their stated mandates, the current status of salmon and steelhead populations and their associated habitats suggests that the existing *institutional management structures* do not adequately respond to the challenges we are currently facing. One need only look at the precipitous and widespread declines of salmon populations in the Pacific region to conclude that, together, the institutions responsible for their management have failed to protect them. While many factors have contributed to the decline (e.g., overfishing, habitat degradation, water quality changes, climate change, etc.), the overriding cause is our failure to effectively and holistically manage human activities so as to avoid mass extinction of non-humans (Hartman et al. 2000). Resource agencies have not yet made the shift to an ecosystem perspective nor have they adopted true adaptive management approaches (Lichatowich 1997).

While resource agencies have made valiant attempts to rectify the shortcomings of the existing management structure, they are often constrained by the lack of a clear mandate, insufficient funding, and/or chronic understaffing. When changes in policy and management have occurred, they have often been incremental, rarely deviating sufficiently from the *status quo* to correct the problem at hand (Cone 1995). There has also been a lack of consistency, over time and between agencies, in setting and implementing management priorities. Most agencies are funded separately and operate under separate mandates, leading to uncoordinated and piecemeal management. For example, Hyatt and Riddell (2000) point out that the objectives of harvest managers and habitat managers often conflict with respect to maintaining "no net loss" in habitat productivity, particularly when the latter depends on forgoing catch to ensure sufficient returns of salmon as key agents of nutrient delivery to streams (see also Bilby et al. 1996). Another problem is that fisheries science has often been stifled in favor of politically or economically favorable outcomes (Hutchings et al. 1997). Lacking clear policy direction and incentives for meaningful change, agencies have often found it difficult to establish effective enough regulations and processes to adequately protect salmon and their habitats.

The lack of consistency and effectiveness among our institutions stems in part from the large number of jurisdictions involved. In the Pacific Northwest alone, there are two federal governments—each represented in the natural resource management arena by a host of agencies—at least six states and provinces, a plethora of local jurisdictions, and numerous indigenous peoples' organizations, all with some role to play in the management of the Pacific salmon resource. Many of the agencies' jurisdictions either overlap or are separated by some political boundary naturally crossed by migrating salmon. Furthermore, many of the decisions influencing salmon habitat, such as land use and zoning, are made at the local government level, institutionally far removed from the primary salmon management agencies. All of these organizations have different agendas and different approaches. Given the number and diversity of jurisdictions and institutions involved, it is little wonder that efforts to protect salmon have been thwarted. Despite efforts to cooperate and achieve consensus, our institutions have not yet developed the collective ability to effectively manage land, water, and fisheries to avoid accelerating the extinction rate of salmon populations in North America.

A FRAMEWORK FOR ECOSYSTEM-BASED MANAGEMENT

Despite the best of efforts, the crisis in Pacific salmon management seems to worsen each year. In California, Oregon, Idaho, and Washington, 1998 was marked by a plethora of listings of salmon populations under the ESA. Each listing generated a requirement to develop and implement an appropriate recovery plan. In British Columbia, sweeping changes in the management of commercial, recreational, and traditional fisheries have been implemented to conserve endangered coho salmon populations and rationalize the commercial fleet (Anderson 1998). Even Alaska has been affected by changes in the abundance of Pacific salmon, prompting Governor Knowles to declare the Bristol Bay fishery a disaster in 1998. Such recent challenges underscore the need for a new, science-based approach to the management of Pacific salmonids and the ecosystems upon which both fish and humans depend. The ecosystem approach provides a framework for meeting these challenges.

The ecosystem approach to planning, research, and management is the most recent phase in a historical succession of environmental management approaches. Previously, we considered ourselves to be separate from the environment in which we lived. This *egocentric approach* viewed the external environment only in terms of our uses of natural resources. However, recent experience has shown us that human activities can have significant and far-reaching impacts on the environment (as evidenced by the declines in salmon abundance) and on the humans who reside in these systems (i.e., the coastal communities that have been devastated by losses in fishing opportunities). Therefore, there is a need for a more holistic approach to environmental management, in which humans are considered as integral components of the ecosystem. The ecosystem approach provides this progressive perspective by integrating the *egocentric* with an *ecocentric view* that considers the broader implications of human activities.

Implementation of the ecosystem approach necessitates the development of an integrated set of policies and managerial practices that relate people to ecosystems of which they are a part, instead of to the external resources or environments with which they interact (Vallentyne and Beeton 1988). The essence of the ecosystem approach is that it relates *wholes* at different levels of integration (i.e., humans and the ecosystems containing humans) rather than the interdependent parts of those systems (i.e., humans and their environment; Christie et al. 1986). The identifying characteristics of the ecosystem approach are:

- a synthesis of integrated knowledge on the ecosystem;
- a holistic perspective of interrelating systems at different levels of integration; and
- actions that are ecological, anticipatory, and ethical (Christie et al. 1986; Vallentyne and Hamilton 1987).

The primary distinction between the environmental (i.e., *egocentric*) and ecosystem (i.e., *ecocentric*) approaches is whether the system under consideration is external to (in the environmental approach) or contains (in the ecosystem approach) the population under study (Vallentyne and Beeton 1988). The conventional concept of the environment is like that of *house*—external and detached; in contrast, ecosystem implies *home*—something that we feel part of and see ourselves in, even when we are not there (Christie et al. 1986). The change from the environmental approach to the ecosystem approach necessitates a change in the view of the environment from a political or people-oriented context to an ecosystem-oriented context (Vallentyne and Beeton 1988). This expanded view then shapes the planning, research, and management decisions that are made within and pertaining to the ecosystem.

Implementation of the ecosystem approach on a watershed basis requires a framework in which to express the environmental management policies that have been established for the ecosystem. In general, this framework is comprised of four functional elements. The first element is a statement of broad *management goals* for the ecosystem. These goals must reflect the importance of the ecosystem to local area residents and other stakeholders. The second element of the framework is a set of *objectives* for the various components of the ecosystem which clarify the scope and intent of the ecosystem goals. The third element of the framework is a set of *ecosystem indicators* (including specific *metrics and targets*), which provide an effective means of measuring the level of attainment of each of the ecosystem goals and objectives. The final element of an ecosystem-based strategic planning process is the development of a fully coordinated action plan which outlines the steps that are needed and schedule for achieving the desired goals and objectives (Lichatowich et al. 1995; Mobraud et al. 1997).

DEVELOPMENT OF A SUSTAINABLE FISHERIES STRATEGY

Realization of the agreed-to, high priority of sustaining west coast salmonid resources will require implementation of an ecosystem-based, comprehensive, and coordinated plan that is developed cooperatively by affected interests located throughout the Pacific Northwest. One of the major deterrents to the development and implementation of this type of strategy has been the lack of

cooperation between the parties involved in the fisheries management process. At the international level, the Canadian and U.S. governments have had difficulty reaching a lasting accord on Pacific salmon management. Political interference from user groups has also prevented government agencies and fisheries commissions from effectively managing the salmonid stocks within their jurisdictions. Even among First Nations and Native American tribes, more cooperation is needed on issues related to fisheries management actions and sharing of the resource. Sustainability will require that all management entities improve cooperation from now on.

While virtually everyone involved recognizes the need to assure the sustainability of our west coast salmonid resources, there has been little agreement on the underlying causes of population declines or on the actions required to protect and restore these populations. For this reason, the Sustainable Fisheries Foundation (SFF) and its partners have initiated a consultative process for developing an ecosystem-based Sustainable Fisheries Strategy (SFS) for west coast salmon and steelhead populations. This SFS is intended to provide a common vision for the future and a framework for action to protect and restore west coast salmonid populations, from Alaska to California.

The SFS is being developed cooperatively by a wide variety of salmon-based interest groups, including federal, provincial, state, and local government agencies, First Nations, Tribal organizations, resource user groups, conservation groups, and concerned citizens. The SFS is evolving from information and technical discussions presented at the "Toward Sustainable Fisheries" conference, which was designed to provide delegates an opportunity to exchange information on a wide range of topics related to Pacific fisheries management, including:

- Status of salmon and steelhead populations;
- Status of freshwater, estuarine, and marine habitats;
- Status of salmon fisheries and related economies;
- Status of salmon and steelhead management;
- First Nations/Tribal fisheries management;
- Opportunities and strategies for attaining sustainable resource use;
- Integration of natural and artificial production;
- Habitat assessment and restoration techniques and initiatives;
- Establishing more effective administrative and regulatory structures;
- Monitoring, assessment, and adaptive fisheries management;
- Community-based and grassroots fisheries management initiatives;
- Addressing uncertainty in fisheries management;
- Shifting social, economic, and cultural priorities;
- Models for sustainable fisheries; and
- Establishing more effective legal and policy frameworks.

In addition to the comprehensive suite of technical sessions, a series of five work group sessions were also convened during the conference. This gave delegates the opportunity for input to the SFS.

The products resulting from the SFS process and its underpinnings have been published in three forms to facilitate access by participants in the process. First, a draft SFS report, which provides an integrated set of principles, guidelines, and actions for restoring salmonid populations to sustainable levels, has been published, distributed for review, and posted on the Internet (SFF 1996). A series of follow-up workshops have also been convened to refine the SFS that was developed at the Victoria conference, to assess its applicability at the watershed level, and to identify key indicators that can be measured to evaluate progress toward sustainable fisheries. The results of the follow-up workshops have been summarized in various documents that have been published by the SFF and its partners (key recommendations are fully articulated in the final chapter of this book).

Second, a guidance manual is being prepared to integrate the input received throughout the project and provide detailed advice on developing community-based programs that embrace the principles of sustainable fisheries management. This manual is being revised in light of experience

gained from several community- and watershed-based forums held during 1996–1998 in Washington and British Columbia.

This book represents a third and critical element of the overall SFS development and implementation process because it provides the principal mechanism for disseminating the science-based information that supports the SFS (i.e., the key technical information presented at the Victoria conference). Importantly, this book provides state-of-the-art information on the following topics:

- Needs and values for sustainable fisheries;
- Status of salmon and steelhead stocks;
- Current approaches to fisheries management;
- Habitat assessment;
- Artificial production;
- Modeling approaches;
- Habitat protection and restoration; and
- Striving toward sustainability.

In addition, the book provides a summary of the guiding principles that form the basis of the SFS. We believe this is an excellent compilation of both historical perspective and numerous innovative ideas for moving toward sustainability. As such, we are hopeful that this book will make a lasting contribution to salmon and steelhead management and provide a template for action that will lead to the implementation of ecosystem-based management and fisheries sustainability in the Pacific Northwest.

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